

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A semiconductor device having a non-volatile memory transistor, comprising:

a first capacitor element and a second capacitor element,

the non-volatile memory transistor, the first and the second capacitor element being formed in one semiconductor substrate,

the first capacitor element including a first lower electrode, a first dielectric film and a first upper electrode,

the second capacitor element having a second lower electrode, a second dielectric film and a second upper electrode, and

the second dielectric film having a film thickness that is different from a film thickness of the first dielectric film,

wherein the first dielectric film has a structure including a thermal oxidation film, a nitride film and an oxide film successively laid in a direction from the first lower electrode toward the first upper electrode, and

wherein the second dielectric film has a structure including a first thermal oxide film, a CVD oxide film, a second thermal oxide film, a nitride film and an oxide film successively laid in a direction from the second lower electrode toward the second upper electrode.

2. (Currently amended) A semiconductor device having a non-volatile memory transistor, comprising:

a first capacitor element and a second capacitor element,

the non-volatile memory transistor, the first and the second capacitor element being formed in one semiconductor substrate,

the first capacitor element including a first lower electrode, a first dielectric film having a plurality of films as components and a first upper electrode,

the second capacitor element having a second lower electrode, a second dielectric film having a plurality of films as components and a second upper electrode, wherein the number of films as components of the second dielectric film of the second capacitor element is at least greater than the number of films as components of the first dielectric film of the first capacitor element, and

the components of the second dielectric film being different from the components of the first dielectric films.

3. (Previously presented) A semiconductor device according to claim 1 or claim 2, wherein the first and the second dielectric film include an ONO film.

4. (Canceled)

5. (Currently amended) A semiconductor device according to claim [[3]] 2, wherein

the first dielectric film has a structure including only a thermal oxidation film, a nitride film and an oxide film successively laid in a direction from the first lower electrode toward the first upper electrode, and

the second dielectric film has a structure including only a first thermal oxide film, a CVD oxide film, a second thermal oxide film, a nitride film and an oxide film successively laid in a direction from the second lower electrode toward the second upper electrode.

6. (Currently amended) A semiconductor device according to claim [[4]] 1, wherein

the thermal oxide film of the first dielectric film and the second thermal oxide film of the second dielectric film are formed in the same step,

the nitride film of the first dielectric film and the nitride film of the second dielectric film are formed in the same step, and

the oxide film of the first dielectric film and the oxide film of the second dielectric film are formed in the same step.

7. (Currently amended) A semiconductor device according to claim [[4]] 1, wherein the CVD oxide film of the second dielectric film includes a high-temperature CVD oxide film.

8. (Currently amended) A semiconductor device according to claim [[4]] 1, wherein each of the oxide film of the first dielectric film and the oxide film of the second dielectric film includes a thermal oxide film.

9. (Previously presented) A semiconductor device according to claim 8, wherein

the thermal oxide film of the first dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 30–200 angstrom,

the nitride film of the first dielectric film has a thickness of 50–500 angstrom,

the oxide film of the first dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 60–80 angstrom,

the first thermal oxide film of the second dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 60–80 angstrom,

the CVD oxide film of the second dielectric film has a thickness of 100–200 angstrom,

the second thermal oxide film of the second dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 30–200 angstrom,

the nitride film of the second dielectric film has a thickness of 50–500 angstrom, and

the oxide film of the second dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 60–80 angstrom.

10. (Currently amended) A semiconductor device according to claim [[4]] 1, wherein each of the oxide film of the first dielectric film and the oxide film of the second dielectric film includes a CVD oxide film.

11. (Previously presented) A semiconductor device according to claim 10, wherein

the thermal oxide film of the first dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 30–200 angstrom,

the nitride film of the first dielectric film has a thickness of 50–500 angstrom,

the oxide film of the first dielectric film has a thickness of 100–200 angstrom.

the first thermal oxide film of the second dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 60–80 angstrom,

the CVD oxide film of the second dielectric film has a thickness of 100–200 angstrom,

the second thermal oxide film of the another dielectric film has a thickness grown by a method that grows a thermal oxide film on silicon to a thickness of 30–200 angstrom,

the nitride film of the second dielectric film has a thickness of 50–500 angstrom, and

the oxide film of the second dielectric film has a thickness of 100–200 angstrom.

12. (Previously presented) A semiconductor device according to claim 1 or claim 2, wherein the first and the second upper electrode are formed from polysilicon.

13. (Currently amended) A semiconductor device ~~according to claim 1 or claim 2 having a non-volatile memory transistor, comprising:~~

a first capacitor element and a second capacitor element,

the non-volatile memory transistor, the first and the second capacitor element being formed in one semiconductor substrate,

the first capacitor element including a first lower electrode, a first dielectric film and a first upper electrode,

the second capacitor element having a second lower electrode, a second dielectric film and a second upper electrode, and

the second dielectric film having a film thickness that is different from a film thickness of the first dielectric film,

wherein the first and the second upper electrodes are formed from polycide.

14. (Currently amended) A semiconductor device ~~according to claim 1 or claim 2 having a non-volatile memory transistor, comprising:~~

a first capacitor element and a second capacitor element,

the non-volatile memory transistor, the first and the second capacitor element being formed in one semiconductor substrate,

the first capacitor element including a first lower electrode, a first dielectric film and a first upper electrode,

the second capacitor element having a second lower electrode, a second dielectric film and a second upper electrode, and

the second dielectric film having a film thickness that is different from a film thickness of the first dielectric film,

wherein the first and the second upper electrodes are formed from metal.

15. (Currently amended) A semiconductor device ~~according to claim 1 or claim 2 having a non-volatile memory transistor, comprising:~~

a first capacitor element and a second capacitor element,

the non-volatile memory transistor, the first and the second capacitor element being formed in one semiconductor substrate,

the first capacitor element including a first lower electrode, a first dielectric film having a plurality of films as components and a first upper electrode,

the second capacitor element having a second lower electrode, a second dielectric film having a plurality of films as components and a second upper electrode, and

the components of the second dielectric film being different from the components of the first dielectric films,

wherein the first and the second upper electrodes are formed from salicide.

16. (Previously presented) A semiconductor device according to claim 1 or claim 2, wherein the first and the second lower electrode are films that are formed in the same step, and the first and the second upper electrode are films that are formed in the same step.

17. (Currently amended) A semiconductor device according to claim [[4]] 1, wherein the non-volatile memory transistor includes

a floating gate,

a control gate, and

an intermediate insulation film located between the floating gate and the control gate, wherein

the intermediate insulation film has a structure having a first thermal oxide film, a CVD oxide film, a second thermal oxide film and an oxide film that are successively disposed in a direction from the floating gate toward the control gate.

18. (Previously presented) A semiconductor device according to claim 17, wherein

the first thermal oxide film of the intermediate insulation film and the first thermal oxide film of the second dielectric film are formed in the same step,

the CVD oxide film of the intermediate insulation film and the CVD oxide film of the second dielectric film are formed in the same step,

the second thermal oxide film of the intermediate insulation film, the thermal oxide film of the first dielectric film and the second thermal oxide film of the second dielectric film are formed in the same step, and

the oxide film of the intermediate insulation film, the oxide film of the first dielectric film and the oxide film of the second dielectric film are formed in the same step.

19. (Original) A semiconductor device according to claim 17, wherein the intermediate insulation film includes a nitride film, wherein

the nitride film of the intermediate insulation film is located below a sidewall of the floating gate and between the second thermal oxide film of the intermediate insulation film and the oxide film of the intermediate insulation film.

20. (Previously presented) A semiconductor device according to claim 19, wherein the nitride film of the intermediate insulation film, the nitride film of the first dielectric film and the nitride film of the second dielectric film are formed in the same step.

21. (Original) A semiconductor device according to claim 17, wherein the CVD oxide film of the intermediate insulation film includes a high-temperature thermal CVD oxide film.

22. (Previously presented) A semiconductor device according to claim 17, wherein the oxide film of the intermediate insulation film includes at least one of a thermal oxide film and a CVD oxide film.

23. (Previously presented) A semiconductor device according to claim 17, wherein the control gate, the first and the second upper electrode are formed from polysilicon.

24. (Previously presented) A semiconductor device according to claim 17, wherein the control gate, the first and the second upper electrode are formed from polycide.

25. (Previously presented) A semiconductor device according to claim 17, wherein the control gate, the first and the second upper electrode are formed from metal.

26. (Previously presented) A semiconductor device according to claim 17, wherein the control gate, the first and the second upper electrode are formed from salicide.

27. (Previously presented) A semiconductor device according to claim 17, wherein the floating gate, the first and the second lower electrode are formed in the same step, and

the control gate, the first and the second upper electrode are formed in the same step.

28. (Previously presented) A semiconductor device according to claim 1 or claim 2, wherein an area of the first upper electrode that faces a surface of the first dielectric film is the same as an area of the second upper electrode that faces a surface of the second dielectric film.

29. (Previously presented) A semiconductor device according to claim 1 or claim 2, wherein an area of the first upper electrode that faces a surface of the first dielectric film is different from an area of the second upper electrode that faces a surface of the second dielectric film.

30. (Currently amended) A semiconductor device ~~according to claim 1 or claim 2 having a non-volatile memory transistor, comprising:~~

a first capacitor element and a second capacitor element,

the non-volatile memory transistor, the first and the second capacitor element being formed in one semiconductor substrate,

the first capacitor element including a first lower electrode, a first dielectric film and a first upper electrode,

the second capacitor element having a second lower electrode, a second dielectric film and a second upper electrode, and

the second dielectric film having a film thickness that is different from a film thickness of the first dielectric film, wherein the second lower electrode has an impurity concentration different from an impurity concentration of the first lower electrode.

31. (Currently amended) A semiconductor device ~~according to claim 1 or claim 2 having a non-volatile memory transistor, comprising:~~

a first capacitor element and a second capacitor element,

the non-volatile memory transistor, the first and the second capacitor element being formed in one semiconductor substrate,

the first capacitor element including a first lower electrode, a first dielectric film having a plurality of films as components and a first upper electrode,

the second capacitor element having a second lower electrode, a second dielectric film having a plurality of films as components and a second upper electrode, and

the components of the second dielectric film being different from the components of the first dielectric films,

wherein the first dielectric film has a film thickness of 180–900 angstrom, and the second dielectric film has a film thickness of 340–1180 angstrom.

32. (Previously presented) A semiconductor device according to claim 1 or claim 2, wherein the first capacitor element has a capacitor value that is different from a capacitor value of the second capacitor element.

33. (Previously presented) A semiconductor device according to claim 1 or claim 2, wherein each of the first and the second capacitor element is a component of an analogue circuit.

34. (Original) A semiconductor device according to claim 1 or claim 2, wherein the non-volatile memory transistor includes a split-gate type non-volatile memory transistor.

35-50. (Canceled)